

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-285990

(43)Date of publication of application : 11.10.1994

(51)Int.CI.

B29C 65/02

B32B 15/08

B32B 31/20

// B29K105:22

(21)Application number : 05-095113

(71)Applicant : NIPPON STEEL CORP

(22)Date of filing : 31.03.1993

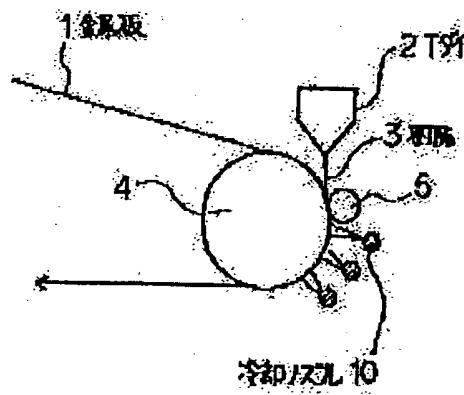
(72)Inventor : FUNAKI MICHIHIRO  
ONO TAKAHISA  
TANAKA ISAMU  
NANRI HIROBUMI

## (54) MANUFACTURE OF LAMINATED METAL PLATE

(57)Abstract:

PURPOSE: To manufacture a thermoplastic resin metal plate in which adhesive properties, processibility, corrosion resistance and external appearance are improved and which has high yield by covering an entire width of the plate at a lateral center of a thermoplastic resin film, and injecting and cooling cooling medium to a surface of the film of a part overcoated with resin.

CONSTITUTION: A laminated metal plate is manufactured by the steps of bringing a press-bonding roll 5 into contact with M plate 1 wound on a winding roll 4 and preheated, feeding a thermoplastic resin film 3 melted by a T die 2 through an extruder to a gap between the roll 5 and the plate 1 and covering the plate 1 with the film. In this case, a width of the film 3 fed down to the gap between the roll 5 and the plate 1 is set larger than that of the plate 1. An entire width of the plate 1 is covered at a lateral center of the film 3. Simultaneously, cooling medium is injected from a cooling nozzle 10 to the surface of the film 3 of a part overcoated with the resin to cool it.



---

## LEGAL STATUS

[Date of request for examination] 24.03.1998

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3048781

[Date of registration] 24.03.2000

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2000 Japan Patent Office

---

## MEANS

[Means for Solving the Problem] this invention to namely, the preheated metal plate which was twisted around the roll with (1) volume In the method of carrying out the pressure welding of the sticking-by-pressure roll, flowing down the thermoplastics film fused from the T die through the extruder in the gap of a sticking-by-pressure roll and a metal plate, covering thermoplastics to a metal plate, and manufacturing a lamination metal plate While making larger than the width of face of a metal plate width of face of the thermoplastics film which flows down in the gap of a sticking-by-pressure roll and a metal plate, having it in the crosswise center section of the thermoplastics film and covering full [ of a metal plate ] The manufacture method of the lamination metal plate characterized by for a resin injecting a cooling medium on the front face of the thermoplastics film of the portion by which the overcoat was carried out, and cooling on it, [0020] (2) Carry out the pressure welding of the sticking-by-pressure roll to the preheated metal plate which was twisted around the roll with a volume. In the method of flowing down the thermoplastics film fused from the T die through the extruder in the gap of a sticking-by-pressure roll and a metal plate, covering thermoplastics to a metal plate, and manufacturing a lamination metal plate While making larger than the width of face of a metal plate width of face of the thermoplastics film which flows down in the gap of a sticking-by-pressure roll and a metal plate, having it in the crosswise center section of the thermoplastics film and covering full [ of a metal plate ] The manufacture method of the lamination metal plate characterized by for a resin carrying out the pressure welding of the cooling roller to the front face of the thermoplastics film of the portion by which the overcoat was carried out, and cooling on it, [0021] (3) Carry out the pressure welding of the sticking-by-pressure roll to the preheated metal plate which was twisted around the roll with a volume. In the method of flowing down the thermoplastics film fused from the T die through the extruder in the gap of a sticking-by-pressure roll and a metal plate, covering thermoplastics to a metal plate, and manufacturing a lamination metal plate While making larger than the width of face of a metal plate width of face of the

thermoplastics film which flows down in the gap of a sticking-by-pressure roll and a metal plate, having it in the crosswise center section of the thermoplastics film and covering full [ of a metal plate ] The manufacture method of the lamination metal plate characterized by reaching [ whether a resin carries out the pressure welding of the cooling roller for the crosswise both ends of the roll with a volume of a portion by which an overcoat is carried out, and ], or injecting a cooling medium, and cooling beforehand, [0022] (4) Carry out the pressure welding of the sticking-by-pressure roll to the preheated metal plate which was twisted around the roll with a volume. In the method of flowing down the thermoplastics film fused from the T die through the extruder in the gap of a sticking-by-pressure roll and a metal plate, covering thermoplastics to a metal plate, and manufacturing a lamination metal plate While making larger than the width of face of a metal plate width of face of the thermoplastics film which flows down in the gap of a sticking-by-pressure roll and a metal plate, having it in the crosswise center section of the thermoplastics film and covering full [ of a metal plate ] While reaching [ whether a resin carries out the pressure welding of the cooling roller for the crosswise both ends of the roll with a volume of a portion by which an overcoat is carried out, and ], or injecting a cooling medium and cooling beforehand The manufacture method of the lamination metal plate characterized by reaching [ whether the pressure welding of the cooling roller is carried out, and ] the front face of the thermoplastics film of a portion with which the overcoat of the resin was carried out, or injecting a cooling medium on it, and cooling on it, [0023] (5) the method of (1), (2), (3), and (4) publications which are characterized by preparing puncturing near [ where an overcoat resin contacts ] the roll surface portion with a volume -- come out

[0024] Hereafter, this invention is explained in detail, referring to a drawing.

[0025] In this invention, a thick steel plate and a thick galvanized steel sheet, the zinc-alloy plating steel plate, a tin plated steel plate, a tin-alloy plating steel plate, an aluminum plating steel plate, an aluminium alloy plating steel plate, or a stainless steel board of board thickness etc. is first used as a metal substrate from the use used for building materials, such as a roof, a wall, and a partition, the charge of automobile material, the material of a home electrical-and-electric-equipment product, furniture, a can, etc.

[0026] Furthermore, what has an about 0.1-5micro chemical-conversion layer on this is contained.

[0027] In order that a chemical conversion may raise the corrosion resistance of a metal substrate, oxidation resistance, and adhesion, it is performed as surface treatment of a metal plate, and is performed by phosphoric-acid zinc processing, phosphoric-acid iron processing, or the electrolytic chromate treatment.

[0028] Furthermore, after not performing a chemical conversion or performing a chemical conversion, what has an adhesives layer on this is contained.

[0029] An adhesives layer is a layer which applied about several [ at least ]micro adhesives, in order to improve the adhesion of a metal substrate and thermoplastics.

[0030] As these adhesives, the adhesive thermoplastics which has functional groups, such as a denaturation polyethylene resin, a denaturation epoxy resin, and denaturation vinyl resin, is suitable.

[0031] Adhesion is good for the both sides of a metal and the thermoplastics used for covering, for example, in the case of a polyolefine covering steel plate, a denaturation polyolefine like an ethylene-vinyl acetate copolymerization resin or an ethylene-acrylic-acid copolymerization resin is suitable for these.

[0032] The thermoplastics used for covering by this invention For example, a polyethylene-terephthalate resin, Polyolefin resin, acrylic resin, polyester resin, polyamide resin, Vinyl chloride resin, a fluororesin, polycarbonate resin, a polystyrene system resin, ABS plastics, a chlorinated-polyether resin, a urethane resin, etc. are typical. to polyolefin resin There are a polymer or copolymers, such as ethylene, a propylene, 1-butene, and 1-pentene. as acrylic

resin There are a polymer or copolymers, such as an acrylic acid, a methacrylic acid, an acrylic ester, methacrylic-acid ester, and an acrylamide. to polyester resin There are a polyethylene terephthalate, oil free polyester, etc. to polyamide resin There are the so-called Nylon 66, nylon 6, Nylon 610, Nylon 11, etc. to vinyl chloride resin There is a copolymer with vinyl acetate, others, for example, ethylene, etc., and there are a polytetraflouoroethylene, a 3 \*\*\*\*-ized ethylene chloride resin, a 6 \*\*\*\*-ized ethylene propylene resin, \*\*\*\*-ized vinyl resin, \*\*\*\*-ized vinylidene resin, etc. in a fluororesin. [ homopolymer ]

[0033] Moreover, you may mix and use two or more resins. Moreover, the additive usually used at the time of film creation, for example, a degradation inhibitor, the modifier, the pigment, etc. may be included.

[0034] Moreover, in case it covers with a melting state, you may add cross linking agents, such as amino resin and an epoxy resin, in the range which does not lose a fluidity.

[0035] These thermoplastics is suitably chosen according to needs, such as weatherability, cold district fitness, thermal resistance, scratch-proof nature, resistance to contamination, chemicals-proof nature, and deep-drawing processability, according to the use of a surface treatment metal plate. For example, a polyolefine is excellent in cold resistance, a polyamide is excellent in abrasion resistance, acrylic resin is excellent in resistance to contamination or chemicals-proof nature, and it is excellent [ a fluororesin ] in weatherability etc.

[0036] The polyethylene-terephthalate resin is especially useful for an acid-proof use.

[0037] Multilayer covering of that monolayer covering is also of the same kind or a different-species resin is sufficient as a resin. In multilayer covering (for example, a multilayer T die), it can carry out, and a glue line can also be prepared between layers.

[0038] At an interlayer thermoplastics in the upper layer for an adhesive resin to a lower layer for example, by the three-layer T die [ the steel plate which is applying and preheating adhesives ] [ the thermoplastics in a melting state ] It can extrude in the shape of a film, and the surface treated steel sheet which carried out multilayer covering directly and continuously can be obtained. Or thermoplastics can be obtained in the 1st lower layer and the surface treated steel sheet which extruded thermoplastics in the shape of a film by the four-layer T die in the 4th best layer at the 3rd interlayer, and carried out multilayer covering of the adhesive resin directly and continuously can be obtained for the adhesive resin which is in the steel plate which is preheating at a melting state to the 2nd interlayer.

[0039] A drawing explains a manufacturing process below.

[0040] A metal substrate needs to precede covering a melting resin and it is necessary to preheat it.

[0041] For example, in the case of a polyethylene terephthalate, the preheating of -120 degrees C or more (therefore, about 135-255 degrees C) of melting points (255 degrees C) is desirable.

[0042] By carrying out a preheating, the fluidity of a resin increases and adhesion improves.

[0043] When not performing a preheating, or when preheat temperature is low and a cooling roller is especially used, the adhesion of a resin is not enough and a result which lacks in corrosion resistance is brought.

[0044] Although the temperature of a preheating is so desirable that it is high since the fluidity of a resin increases, since a resin and adhesives will decompose if too high, it is not desirable. Moreover, it is not desirable from a viewpoint of energy saving.

[0045] Therefore, it is preferably carried out below the temperature of a melting resin by temperature lower 50 degrees C or more than the temperature of a melting resin, and the preheat temperature of about 50-230 degrees C of usual.

[0046] Drawing 1 carries out the pressure welding of the sticking-by-pressure roll 5 to the front face of the metal substrate 1 which twisted and was twisted around the roll 4 and which it preheated, flows down the thermoplastics film 3 fused from T die 2 through the extruder to the interface of the metal substrate front face and sticking-by-pressure roll 5, and shows the